



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/674,703	09/30/2003	David L. O'Meara	FKL-002	4557
37694	7590	07/18/2006	EXAMINER	
WOOD, HERRON & EVANS, LLP (TOKYO ELECTRON)			GEORGE, PATRICIA ANN	
2700 CAREW TOWER			ART UNIT	
441 VINE STREET			PAPER NUMBER	
CINCINNATI, OH 45202			1765	

DATE MAILED: 07/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/674,703	Applicant(s) O'MEARA ET AL.	
	Examiner Patricia A. George	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,5-18,20,21,23-25 and 30-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5-18,20,21,23-25, 30-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 1, 5-9, 12-13, 17, 20, 21, and 31-32 are rejected under 35 U.S.C. 102(e) as being anticipated by Yin et al. of USPN 6379575.

Yin et al. discloses a well known and conventional method of monitoring the status of both a system and the components with protective coatings in a processing system. Yin teaches the method of exposing a wafer (i.e. system component) (ab.) consisting of silicon oxide and silicon nitride (col.10, line 63) to an activated cleaning gas (i.e. reactant gas – ab.) to clean (i.e. during a process – ab.) system components (col.4, l.1-24) without excessive erosion (i.e. form an erosion product – col.3, l.14). Release of the erosion product is determined (i.e. monitoring of erosion product to reach a threshold value as in claim 21– col.112, l.29-33) and the process step is continued or completed (i.e. stopped – col.12, l.30) by means of end point detection (col.12, l.29). The disclosures of Lin et al., above, teach all the limitations of applicants' claims 1, 21, and 31.

As to claim 5, Yin et al. discloses it is desirable to have a treatment that cleans and removes etchant deposits from system component/s (col.3, l.4-15).

As to claim 6, Yin et al. discloses the system component has a material deposited on it that contains silicon, silicon nitride, silicon oxide (col.10, l.63).

As to claim 7, Yin teaches substrate etching (ab.), chamber cleaning (ab.), and substrate film forming process (etch residue – ab.).

As to claims 8, 12, and 13, Yin discloses use of halogen-containing (col.11, l.16-18 and col.13, l.13-14) and Hf-containing (col.11, l.15) gases for etching or cleaning a substrate.

As to claim 9, Yin et al. discloses the following reactant gases for cleaning: NF.sub.3, CF.sub.4, SF.sub.6, C.sub.2 F.sub.6, CCl.sub.4, C.sub.2 Cl.sub.6 or mixtures thereof.

As for claim 17, Yin teaches operating the processing system at a chamber pressure of 0.1 to 400mTorr, which is overlapping and encompassed by the claimed range of between 10 mTorr and about 760 Torr during the exposing (col. 7, l. 33).

As for claim 20, Yin et al. discloses the monitoring is desirable and consists of an optical (col.12, l.29) monitoring system that detects light emission (col.12, l. 34) of a particular wavelength (col.12,l.34).

As to claim 32, Yin teaches a protective coating for components comprises aluminum nitride, boron carbide, boron nitride, diamond, silicon oxide, silicon carbide, silicon nitride, titanium oxide, titanium carbide, yttrium oxide, zirconium oxide, or mixtures thereof (ab.).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

As to claim 2, Yin et al. discloses the exposed system component comprises a process tube (col.8, l.9), a ring (col.9, l.58), chamber walls (ab.), an injector (col.9, l.35-40), a ceramic member (i.e. substrate holder – col.7, l.10-14), a cap cover (col.9, l.56-57), and an electrode (col.7, p.50-55).

It is noted that the reference of Tin, fails to recite the specifically defined system component structures defined in claim 2.

However, It would have been obvious to one of ordinary skill in the art at the time of invention was made, to process any structural form, including the structures listed in applicants' claim 2, according to the disclosed monitoring process disclosed by Yin because such a monitoring process would appear to be effective for any shaped structure since it is dependent on the chemical composition of the surface to be treated. For instance, if the monitoring process for SiN would be effective for a wafer coated with SiN, it would also be effective for an electrode having SiN on its surface.

Claim Rejections - 35 USC § 103

Claims 14-16 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yin et al. of USPN 6379575 (see discussion above) in view of Tsai et al. of USPN 6,592,817.

Yin et al. fails to teach specific process parameters, reactant gas, and apparatus limitations during a substrate film formation process as in claim 14, 15, 16, and 30.

As for claim 14, Tsai teaches monitoring the reactant gases containing at least one of a silicon-containing gas (col. 10, l. 63) and a nitrogen-containing gas for depositing a film (l. 3) during a substrate film formation process (col. 12, l. 3).

As for claim 15, Tsai teaches the reactant gas containing tetraethyl orthosilicate (TEOS) (col. 15, l. 7-15) for depositing a film during a substrate film formation process.

It would have been obvious to one ordinary skill in the art at the time of invention was made, to modify the invention of end point detection, of Yin, to detect the end of a process using TEOS, Si, or N , as Tsai, because Yin teaches end point detection is well known and conventional.

As for claim 16, Tsai teaches during a thermal deposition process, a hot liquid is circulated through the chamber walls to maintain the chamber at elevated temperatures (col. 11, l. 46-49).

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to use a CVD process that maintains the temperature of the chamber, by circulation of heat, because Tsai teaches it is desirable to stop such a process through end point, and Yin teaches an improved end point for CVD chambers.

As for claim 30, Tsai teaches all the elements of monitoring the release of halide species erosion products, such as silicon halide and silicon oxyhalide. Tsai teaches the deposition of silicon and silicon oxide (col. 3, l. 37 and 41) in the process chamber (col. 3, l. 32), the presence of halide ion (claim 8) which are contributed by etchants which are free fluorine radicals, NF.sub.3 (col. 3, l. 50), then by conversion of gas to dissociated species (col. 3, l. 47-49), are monitored (claim 43) as a halide species erosion product. Because the chemistry of a halide species erosion products are present and monitored, halide species erosion products such as silicon halide and silicon oxyhalide exist.

It would have been obvious to one ordinary skill in the art at the time of invention was made, to modify the invention of end point detection, of Yin, to detect the end of a process having halide species erosion products, because Tsai teaches it is desirable to stop such a process through end point, and Yin teaches an improved end point for CVD chambers.

Claim Rejections - 35 USC § 103

Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yin et al. (see discussion above) in view of Chow et al. of USPN 6,872,322.

The teachings of Yin are silent as to the types of reactant gas used for chamber conditioning, as in claims 10 and 11.

Chow teaches it is conventional to use of the reactant gas containing silicon (col. 13, l. 55-60), or NH.sub.3 (col. 9, l. 11, and 26-30) when conditioning a chamber (col. 12, L. 13-17) as in claims 10 and 11.

As for claim 10, Chow teaches the exposing comprises the reactant gas containing at least one of a silicon-containing gas (col. 13, l. 55-60) for conditioning the system component during a chamber conditioning process (col. 12, L. 13-17).

As for claim 11, Chow teaches the exposing comprises the reactant gas containing at least one of dichlorosilane and NH.sub.3 (col. 9, l. 11, and 26-30) for conditioning the system component during a chamber conditioning process.

It would have been obvious to one ordinary skill in the art at the time of invention was made, to modify the invention of end point detection, of Yin, to detect the end of a process using dichlorosilane or a nitrogen containing gas because Yin teaches it is well known that conditioning the chamber as it creates the byproduct of a passivation layer.

Claim Rejections - 35 USC § 103

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yin (see discussion above) in view of Kim et al. (USPN 6,436,303).

Yin teaches the process parameter of chamber pressure is typically from 0.1 to 400 mTorr, which overlaps the applicants' range of 200mTorr to about 760Torr.

Yin is silent as to the process parameter of temperature, as in applicants' claim 18.

Kim teaches an effective range for etching chamber temperature from about 200 to 800.degree C. (l. 39-40), as defined by claim 18.

It would have been obvious to one ordinary skill in the art at the time of invention was made to select a process temperature, as Kim, when etching, as Yin, because Kim teaches an effective etching process for accomplishing the desired etch.

Claim Rejections - 35 USC § 103

Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yin in view of Nakata et al. (USPN 5,989,928).

See discussion on the teachings of Yin above.

Yin does not teach the use of a gas mass sensor.

Nakata teaches the wide use of spectral analysis (col. 6, l.2) measuring from a specified species (col. 5, l. 32, written on "selected"). Nakata also teaches that mass spectrometry (col. 1, l. 37-42) is taught in prior art which includes detecting radicals(col. 1, l. 38) or ions (col. 1, l. 39) such as an etching gas (col. 1, l. 39) or a decomposition (col.1, l. 39) product or reaction product of emissions (col. 1, l. 40).

As for claim 23, Nakata teaches prior art uses the monitoring comprises using a mass sensor to detect a mass signal from the erosion product (col. 1, l. 37-42).

As for claim 24, Nakata teaches the monitoring further comprises determining if an intensity level of the spectral analyzer has reached a threshold value (col. 6, l. 27-29), which is written on the limitation "mass signal".

It would have been obvious to one ordinary skill in the art at the time of invention was made, to modify the end point detection teachings of Yin to include the use of mass spectrometry of Nakata, because Nakata teaches improvements.

Response to Arguments

Applicants' arguments are not persuasive with respect to the fact that the reference of Yin fails to disclose a system component. The wafer disclosed by Yin is considered to read on a system component because it is made of the same material defined in claim 1 (i.e. SiN). The term system component does not exclude wafers.

As a result, the 102(b) rejection of claim 2 is withdrawn. A new grounds of rejection is set forth above to address applicants' newly submitted amendments to the claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art made of record: USPN 6,894,769.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patricia (Patty) George whose telephone number is (571) 272-5955. The examiner can normally be reached between 7:00am and 4:30pm on any weekday.

Art Unit: 1765

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

07/06

PAG

NADINE NORTON
ART UNIT 1765
SUPERVISORY PATENT EXAMINER
